Ⅱ Counting Sort

A{2, 1, 5, 3, 1, 2, 5}
  1 2 3 4 5 6 7

B{ , , , , , }

C{0, 2, 4, 5, 5, 7, 7}
  0 1 2 3 4 5 6

i=7

B{ , , , , , , 5}   C{0, 2, 4, 5, 5, 6, 7}

i=6

B{ , , , 2, , , 5}   C{0, 2, 3, 5, 5, 6, 7}

i=5

B{ , 1, , 2, , , 5}   C{0, 1, 3, 5, 5, 6, 7}

i=4

B{ , 1, , 2, 3, , 5}   C{0, 1, 3, 4, 5, 6, 7}

i=3

B{ , 1, , 2, 3, 5, 5}   C{0, 1, 3, 4, 5, 5, 7}

i=2

B{1, 1, , 2, 3, 5, 5}   C{0, 0, 3, 4, 5, 5, 7}

i=1

B{1, 1, 2, 2, 3, 5, 5}   C{0, 0, 2, 4, 5, 5, 7}

Ⅰ Heap Sort

a) - left & right $O(n)$ because we
have to traverse the linked list
- parent : $O(2n) \rightarrow O(n)$ because we
have to find the children first and then
traverse to find the parent

b)

- find Max() = $O(1)$ Because
Max is at the beginning of the heap

- insert (key): $O(n)$ b/c we need time
to traverse to the place needed to be
insert

- extract Max() = $O(n)$ b/c when we
extract max, we have to reassign pointers
of the heap to create a new heap with
a new Max

III. Hash Table

1)

$h(2) = 2 \bmod 10 = 2$
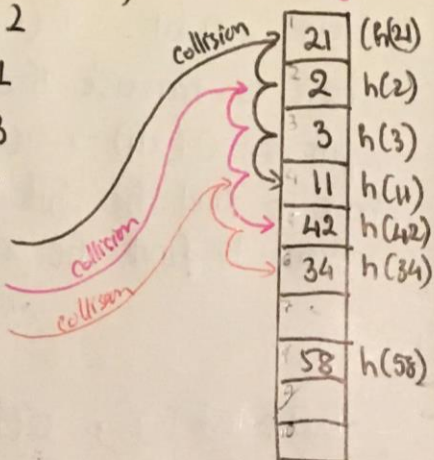
$h(21) = 21 \bmod 10 = 1$

$h(3) = 3 \bmod 10 = 3$

$h(58) = 58 \bmod 10 = 8$

$h(11) = 11 \bmod 10 = 1$

$h(42) = 42 \bmod 10 = 2$

$h(34) = 34 \bmod 10 = 4$

a) linear probing

collision

21	(h(21))
2	h(2)
3	h(3)
11	h(11)
42	h(42)
34	h(34)
58	h(58)

collision
collision

b) Chaining

21	→ 11
2	→ 42
3	
34	
58	

start at 0?
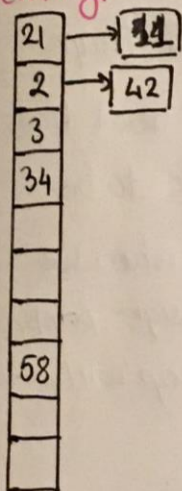
b)

$k.s = 14 . 10$

$= 140$

$= 1000\ 1101_2$

The right most $w=4$ bits : 1101

Convert the left most $p=3$ bit back to int:

~~101~~ $110 = \boxed{6}$

$\boxed{h(14) = 6}$ using implementation describe in the note

2)

$h(k) = \lfloor m(kA - \lfloor kA \rfloor) \rfloor$ $A = 0.625$ $m = 8$

$h(8) = \lfloor 8 . (8 . 0.625 - \lfloor 8 . 0.625 \rfloor) \rfloor$

$\quad = \lfloor 8 . (5 - 5) \rfloor = \boxed{0}$

$h(14) = \lfloor 8 . (14 . 0.625 - \lfloor 14 . 0.625 \rfloor) \rfloor$

$\quad = \lfloor 8 . (8.75 - 8) \rfloor = \cancel{\lfloor 10 \rfloor} \cancel{\lfloor 14 \rfloor}$

$\quad = \lfloor 6 \rfloor = \boxed{6}$

$h(5) = \lfloor 8 (5 \times 0.625 - \lfloor 5 . 0.625 \rfloor) \rfloor$

$\quad = \lfloor 8 . (3.125 - 3) \rfloor$

$\quad = \lfloor 1 \rfloor = \boxed{1}$

8	0
5	1
	2
	3
	4
	5
14	6
	7